Math 3C Fall 2013 – Final Exam version A

Instructions: Put your name and PID on your blue book. Also, write which version of the test on the front of your blue book (this is Version A). Have your student ID out on your desk. No calculators or electronic devices are allowed. Turn off and put away your cell phone. You may use one page of handwritten notes, but no other notes, books, or resources. Make sure your solutions are clear and legible, and show all your work. Credit may not be given for unreadable or unsupported answers. Write your solutions in your blue book, keeping the questions in order, and clearly indicating which problem is on which page.

Question 0: (1 point) Read the instructions above and make sure you have followed them all, as well as any instructions given by the professor during the test.

Question 1: (6 points) Find the equation of the line parallel to the line $2x + y = 1$ passing through the point $(-1, 3)$. Express your answer in slope-intercept form ($y = mx + b$).

Question 2: (6 points) Solve the system of equations

$$\begin{aligned} 2x + 3y + z &= 1 \\ x + 2y + 3z &= 5 \\ -3x - y + z &= 0. \end{aligned}$$

Question 3: (6 points) Let $f(x) = 4x^2 - 12x + 1$.

(a) Write $f(x)$ in the form $f(x) = a(x - h)^2 + k$. (In other words, complete the square.)

(b) Find the vertex of the parabola defined by f.

(c) Find the range of f.

Question 4: (6 points) Expand the expression $\log\left(\sqrt{\frac{xy}{z^3}}\right)$ using log rules. (In your answer, the only thing inside of a log should be x, y, or z.)

Question 5: (6 points) Find the domain of the function $f(x) = \ln(2 - |x|)$.

Question 6: (7 points) Find all the solutions to the system

$$x^2 + y^2 = 2 \quad \text{and} \quad \ln(xy) = 0$$

Question 7: (6 points) Define $f(x) = 2 + 3e^{-2x+1}$. Find f^{-1}.

Question 8: (12 points) Evaluate the following:

(a) $\cos\left(\frac{19\pi}{6}\right)$.

(b) $\tan\left(-\frac{5\pi}{6}\right)$.

(c) $\tan^{-1}\left(-\frac{1}{\sqrt{3}}\right)$.

(d) $\sin^{-1}\left(\sin\frac{4\pi}{3}\right)$.

Question 9: (6 points) You are 10 feet away from a tree, and looking up at the top of the tree makes an angle of 60° from horizontal. Assume further that your eye level is 6 feet above the ground. How tall is the tree?

Question 10: (6 points) Compute $\cos\left(\tan^{-1}\left(\frac{3}{8}\right)\right)$.

Question 11: (6 points) Suppose $\pi < \theta < \frac{3\pi}{2}$ and that $\cos\theta = -\frac{4}{7}$. Compute $\sin\theta$.

Question 12: (6 points) Assume the function f has the form $f(x) = a\cos(bx) + c$. Assume further that f has amplitude 4, period $4\pi/3$, and that the range is $[-2, 6]$. Find a, b, and c.